

III. AMENDMENTS TO THE SPECIFICATION

In the Specification on page 1, line 2, please replace the title as follows:

~~Data Entry Method and Apparatus~~
Menu Selection Method and Apparatus

5

In the Specification on page 1, please replace the paragraph beginning on line 4 and ending on line 10 as follows:

This is a continuation-in-part application of pending prior international application Number PCT/US95/03591 filed 27 March 1995 entitled "Method of and Apparatus for Data Entry" which
10 designated the United States, as amended 25 April 1995 and 26 May 1995. The international application has issued as U.S. Patent No. 6,160,536. Two continuing applications of the above international application are copending with this application. They are, respectively, a continuation-in-part application entitled "Sound Operated Menu Method and Apparatus" issued as U.S. Patent No. 5,999,895 and a continuation-in-part application entitled "~~Data Entry Method in Ideographic Languages.~~" "User Interface
15 Method and Apparatus" issued as U.S Patent No. 6,005,549. This application and both copending applications were filed on the same date.

In the Specification on page 27, please replace the paragraph beginning on line 13 and ending on line 17 as follows:

20 Additional objects, advantages and novel features of the invention will be set forth in part in the description which follows, and in part will become apparent to those skilled in the art upon examination of the following or may be learned by practice of the invention. The objects and advantages of the Perimeter Menu, Confinement, and Location Indication aspects of the invention may be realized and attained by means of the instrumentalities and combinations particularly pointed out in the appended
25 claims.

In the Specification, please delete from page 27, line 22 beginning with "A & B. Perimeter Menu and Confinement" through "(b) selecting, in response a selection event, the sequence indicated by the operator." on page 33, line 30 inclusive.

30 In the Specification on page 26, line 22 please add:

The objects mentioned in the Background Art section describing the Perimeter Menu, Confinement, and Location Indication aspects of the invention, and other objects and advantages are attained by the present invention. The invention includes an apparatus an apparatus for selecting a menu option from a plurality of menu options. The apparatus comprises: (a) a display screen; (b) means for at least partially
5 delimiting a plurality of selectable regions. Each of the selectable regions is outside the display screen and each is associated respectively with a displayed menu option; (c) movement related signal receiving means for receiving a movement related signal. The movement related signal receiving means indicates successive locations with respect to the display screen; and (d) selection means. The selection means is responsive to a first dwell event associated with a particular one of the selectable regions outside the
10 display screen. The particular selectable region is intersected by a plurality of the successive locations. Responsive to the first dwell event, the selection means selects the menu option associated with the particular selectable region.

The invention further includes an apparatus in a human interface system. The human interface system
15 includes a display on which a first cursor may be displayed and moved responsive to successive locations indicated by a movement related signal. The apparatus is for selecting a menu option associated with a particular overshoot selectable region on the display. The apparatus comprises: (a) display means for displaying a plurality of selectable regions within a first polygon intersecting the display. The particular selectable region is one of the plurality of selectable regions. Each selectable region is associated
20 respectively with a menu option. Each selectable region is adjacent a side of the first polygon. The plurality of selectable regions together at least partially circumscribe a region on the display; (b) movement related signal receiving means for receiving the movement related signal indicating the successive locations; and (c) control means. The control means is for: (1) moving the first cursor within the first polygon responsive to the successive locations indicated by the movement related signal; (2)
25 confining at least part of the first cursor to the first polygon; and (3) in response to a first quantity equalling or exceeding a predetermined quantity, the first quantity being a function of the durations of one or more successive periods of intersection of the first cursor and the particular selectable region, selecting the menu option associated with the particular selectable region.

30 The invention also includes an apparatus for selecting a submenu option from a menu hierarchy. The

apparatus comprises: (a) a display area; (b) a menu comprising a plurality of menu options. A specific one of the menu options is associated with a submenu comprising a plurality of submenu options; (c) means for at least partially delimiting: (1) a plurality of first selectable regions. Each of the first selectable regions is associated respectively with one of the menu options and each of the first selectable regions includes a first subregion adjacent the display area and a first subregion on the display area. The plurality of the first subregions on the display area together at least partially circumscribing a first region on the display area; and (2) a plurality of second selectable regions. Each of the second selectable regions is associated respectively with one of the submenu options and each of the second selectable regions includes a second subregion adjacent the display area and a second subregion on the display area. The plurality of the second subregions on the display area together at least partially circumscribing a second region on the display area; (d) movement related signal receiving means for receiving a movement related signal indicating successive locations with respect to the display area; and (e) selection means for selecting the specific menu option in response to a first dwell event triggered by a specific one of the successive locations intersecting the first selectable region associated with the specific menu option, and for selecting a particular one of the submenu options in response to a second dwell event triggered by a particular one of the successive locations intersecting the second selectable region associated with the particular submenu option.

Also included in the invention is an apparatus for selecting a menu option from a plurality of menu options. The apparatus comprises: (a) a display area; (b) delimit means for at least partially delimiting a plurality of selectable regions. Each of the selectable regions is outside the display area and each is associated respectively with a menu option; (c) movement related signal receiving means for receiving a movement related signal indicating a first location with respect to the display area. The first location intersects a particular one of the selectable regions; (d) a plurality of indicators, each associated respectively with one of the selectable regions, for indicating which one of the selectable regions is intersected by the location; and (e) selection means for selecting, in response to a first selection event associated with the intersection of the first location and the particular selectable region, the menu option associated with the particular selectable region.

The invention includes another apparatus for selecting a menu option from a plurality of menu options.

The apparatus comprises: (a) a surface; (b) means for delimiting a plurality of selectable regions on the surface. Each of the selectable regions is associated respectively with one of the menu options. The plurality of selectable regions together at least partially circumscribe a region on the surface; (c) a pointer. The pointer is responsive to the movement of any one of an operator's limbs, digits and head, for indicating successive locations on the surface; and (d) selection means. The selection means selects, in response to a dwell event, the menu option associated with the selectable region intersected by one of the successive locations indicated by the pointer.

The invention includes yet another apparatus for selecting a menu option from a plurality of menu options. The apparatus comprises: (a) means for displaying a plurality of selectable regions on a display area. Each of the selectable regions is associated respectively with a menu option. The plurality of selectable regions together at least partially circumscribing a region on the display area; (b) movement related signal receiving means for receiving a movement related signal indicating successive locations with respect to the display area; and (c) selection means. The selection means is responsive to a quantity equalling or exceeding a predetermined quantity. The quantity is a function of the durations of a plurality of successive periods of intersection of two or more of the successive locations and one of the selectable regions. The selection means selects the menu option associated with the intersected selectable region.

The invention further includes an apparatus for selecting an option from a menu. The apparatus comprises: (a) cursor movement means for receiving a movement related signal and for moving a cursor on a display responsive to the received movement related signal; (b) delimit means for delimiting on the display a first plurality of regions and a second plurality of selectable regions. Each of the second plurality of selectable regions is associated respectively with a menu option. The first plurality of regions together at least partially circumscribing a first region on the display; and (c) selection means, responsive only to an intersection of the cursor and a first one of the first plurality of regions and thereafter to a first selection event associated with one of the second plurality of selectable regions, for selecting the menu option associated with the selectable region associated with the first selection event.

The invention further includes a menu option selector. The menu option selector is in a human interface

system wherein a body member of an operator may indicate a location on a surface. The menu option selector comprises: (a) the surface including a display area. The display area has thereon a plurality of selectable regions. Each of the selectable regions is associated respectively with a menu option. The plurality of selectable regions together at least partially circumscribe a region on the display area; (b) a clipper for generating, in response to the location indicated by the body member of the operator indicating a location outside the display area, a clipped location indicative of a location on the display area intersecting a particular one of the selectable regions; and (c) a selection device for selecting the menu option associated with the particular selectable region. The selection is in response to a selection event including the intersection of the clipped location and the particular selectable region.

The invention includes another menu option selector. The menu option selector is in a human interface system wherein a body member of an operator may indicate a location on a surface. The menu option selector comprises: (a) the surface including a display area. The display area has thereon a plurality of selectable regions. Each of the selectable regions is associated respectively with a menu option. The plurality of selectable regions together at least partially circumscribe a region on the display area; (b) a confiner for confining the location indicated by the body member of the operator to the display area. The confined location intersects a particular one of the selectable regions; and (c) a selection device for selecting, in response to a selection event including the intersection of the confined location and the particular selectable region, the menu option associated with the selectable region.

The invention includes yet another menu option selector. The menu option selector is in a human interface system wherein a body member of an operator may indicate successive locations on a surface. The menu option selector comprises: (a) a detector area on the surface. The detector area includes a plurality of selectable regions. Each of the selectable regions is associated respectively with a menu option. The plurality of selectable regions together at least partially circumscribe a region on the surface; (b) a confiner for confining the location indicated by the body member of the operator to the detector area. The confined location intersects one of the selectable regions; and (c) a selection device for selecting, in response to a dwell event associated with the selectable region intersected by the confined location, the menu option associated with the selectable region associated with the dwell event.

Another apparatus included in the invention is an apparatus for selecting an option from a menu. The apparatus comprises: (a) a display area; (b) display means for displaying a plurality of menu options. The display of the plurality of menu options together at least partially circumscribes a first region on the display area. Each menu option associated is respectively with a position of a user activatable switch outside the display area. The switch is positionable with respect to the location of each menu option for selection thereof; and (c) a selection device for selecting a particular one of the menu options in response to a first position of the switch corresponding to the particular menu option for a period equalling or exceeding a first predetermined time period.

In addition, the invention includes an apparatus for use with a general purpose computer system. The general purpose computer system includes a display on which a cursor may be displayed. The general purpose computer system is capable of executing an application program. The apparatus comprises: (a) a medium readable by the general purpose computer system; and (b) a program, stored on the medium and executable by the general purpose computer system. The program is for: (1) displaying a plurality of selectable regions within a polygon on the display. Each selectable region is adjacent a side of the polygon. One or more of the selectable regions is each associated respectively with a sequence of one or more characters. The plurality of selectable regions together at least partially circumscribes a region on the display; (2) receiving a movement related signal and moving at least part of the cursor only within the polygon responsive to the movement related signal; and (3) in response to a first quantity equalling or exceeding a predetermined quantity, the first quantity being a function of the durations of one or more successive periods of intersection of the cursor and one of the one or more selectable regions, inputting the sequence of one or more characters associated with the intersected selectable region to the application program.

The invention further includes a data entry system including a computer system on which may be executed an application program. The data entry system comprises: (a) the computer system including a display; (b) a pointer selected from the group consisting of a (1) mouse; (2) trackball; (3) joystick; (4) stylus and graphics tablet; (5) lightpen; (6) thumb wheel; (7) touch screen; (8) head pointer; and (9) intraoral pointer. The pointer is coupled to the computer system; and (c) program means executable on the computer system. The program means is for: (1) displaying a plurality of selectable regions within a

5 polygon on the display. Each selectable region is adjacent a side of the polygon, and the plurality of selectable regions together at least partially circumscribe a region on the display; (2) moving a cursor within the polygon responsive to movement of the pointer; and (3) in response to a selection event including an intersection of the cursor and a particular one of the selectable regions, the particular selectable region associated with an input for the application program, inputting the input to the application program.

10 The invention also includes a computer access system for an operator having impaired motor capability. The computer access system includes a computer system on which may be executed a computer program. The computer access system comprises: (a) the computer system including a display; (b) program means executable on the computer system for: (1) displaying a plurality of selectable regions within a polygon on the display. Each selectable region is adjacent a side of the polygon. The plurality of selectable regions together at least partially circumscribes a region on the display; (2) receiving a movement related signal and moving at least part of a cursor only within the polygon responsive to the movement related signal; and (3) in response to a selection event including an intersection of the cursor and a particular one of the selectable regions, the particular selectable region associated with an input for the computer program, inputting the input to the computer program.

20 The invention further includes a voice output system for a user having impaired speech. The voice output system comprises: (a) a display capable of displaying a plurality of selectable regions within a polygon on the display. Each selectable region is adjacent a side of the polygon. One or more of the selectable regions is associated respectively with and displays on the display a sequence of one or more letters. The plurality of selectable regions together at least partially circumscribe a region on the display; (b) a voice output device; and (c) control means for: (1) receiving a movement related signal and moving a cursor within the polygon responsive to the movement related signal; (2) in response to a succession of selection events, each associated respectively with an intersection of the cursor and one of the selectable regions associated with one of the one or more sequences of one or more letters, appending the sequence associated with the intersected selectable region to at least one previously selected sequence; and (3) speaking, by means of the voice output device, the word spelled by the appended sequences.

The invention also includes a device controller. The device controller comprises: (a) means for displaying a plurality of selectable regions within a polygon on a surface. Each selectable region is adjacent a side of the polygon. Each selectable region is associated respectively with a device control signal. The plurality of selectable regions together at least partially circumscribe a region of the polygon; (b) means for receiving a movement related signal and moving at least part of a cursor only within the polygon in response to the received movement related signal; and (c) signal generating means coupled to a device for generating, in response to a selection event associated with one of the plurality of selectable regions intersected by the cursor, the device control signal associated with the intersected selectable region.

Also included in the invention is an apparatus for editing a document. The apparatus comprises: means for selecting a first sequence of one or more graphic symbols from a plurality of sequences of one or more graphic symbols, at least part of each of the plurality of sequences having a common attribute for optical recognition purposes; means for inputting the first sequence into the document; means for delimiting on a display a plurality of selectable regions, the plurality of selectable regions together at least partially circumscribing a region on the display, at least two of the selectable regions associated respectively with a sequence of the plurality of sequences; means for displaying on the display the at least two sequences of the plurality of sequences associated with the at least two selectable regions; means for receiving a movement related signal and moving a cursor on the display responsive thereto; and in response to a selection event wherein the cursor at or near the time the selection event occurs intersects any one of the at least two selectable regions, means for inputting the sequence associated with the intersected selectable region into the document.

The invention further includes a method of selecting a menu option from a plurality of menu options. The method is for use with a surface comprising a display area. The method comprises the steps of: at least partially delimiting a plurality of selectable regions, each of the selectable regions associated respectively with a menu option and each of the selectable regions including an invisible subregion outside the display area and a visible subregion on the display area, the plurality of visible subregions together at least partially circumscribing a region on the display area; receiving a movement related signal indicating successive locations with respect to the display area; and selecting, in response to a

dwelling event associated with one of the selectable regions, the menu option associated with the selectable region associated with the dwelling event.

5 The invention includes another method of selecting a menu option from a plurality of menu options. The method is for use with a human interface system wherein a body member of an operator may indicate successive locations on a surface. The surface includes a display area. The display area has thereon a plurality of selectable regions, each of the selectable regions associated respectively with a menu option. The plurality of selectable regions together at least partially circumscribe a region on the display area. The method comprises the steps of: confining each of the successive locations to the display area; and
10 selecting, in response to a dwelling event associated with one of the selectable regions, the menu option associated with the selectable region associated with the dwelling event.

Also included in the invention is a method of speaking using a voice output system including a display and a voice output device. The method comprises the steps of: displaying a plurality of selectable
15 regions within a polygon on the display, each selectable region adjacent a side of the polygon and one or more of the selectable regions associated respectively with a sequence of one or more characters, the plurality of selectable regions together at least partially circumscribing a region on the display; receiving a movement related signal and moving at least part of a cursor only within the polygon responsive to the movement related signal; repetitively: (i) in response to a first quantity equalling or
20 exceeding a predetermined quantity, the first quantity being a function of the durations of one or more successive periods of intersection of the cursor and one of the one or more selectable regions, selecting the sequence associated with the intersected selectable region; and (ii) appending the selected sequence to at least one previously selected sequence; and speaking, by means of the voice output device, the word spelled by the appended sequences.

25 Further included in the invention is an apparatus for selecting a menu option from a plurality of pluralities of menu options. The apparatus comprises: (a) a surface; (b) means for delimiting a plurality of selectable regions on the surface. The plurality of selectable regions together at least partially circumscribe a region on the surface; (c) a pointer, responsive to the movement of a body member of a
30 user, for indicating successive locations on the surface; (d) sensor signal receiving means for receiving a

sensor signal; and (e) selection means. The selection means, responsive to the sensor signal, associates each of the selectable regions respectively with the menu options of one of the plurality of menu options. In addition, the selection means, responsive to a quantity equalling or exceeding a predetermined quantity, the quantity being a function of the durations of one or more successive periods of intersection of two or more of the successive locations and a particular one of the selectable regions, selects the menu option associated with the particular selectable region.

The invention includes another menu option selector. The menu option selector is in a human interface system wherein a body member of an operator may indicate a location on a surface. The menu option selector comprises: (a) the surface including a display area. The display area has thereon a plurality of pluralities of selectable regions. Each of the pluralities of selectable regions respectively at least partially circumscribes a region on the display area; (b) a sensor for sensing an actual or attempted muscle activation of the operator and, responsive thereto, for associating each selectable region of a particular one of the pluralities of selectable regions respectively with a menu option; (c) a clipper for generating, in response to the location indicated by the body member of the operator indicating a location outside the display area, a clipped location indicative of a location on the display area intersecting a selectable region of the particular plurality of selectable regions; and (d) a selection device for selecting, in response to a selection event associated with the selectable region intersected by the clipped location, the menu option associated with the selectable region intersected by the clipped location.

The invention also includes a voice output system for a user having impaired motor control. The voice output system comprises: (a) a display screen; (b) a delimit device completely delimiting an invisible selectable region outside the display screen associated with a sequence of one or more words; (c) a voice output device; (d) a movement related signal receiver for receiving a movement related signal indicating successive locations with respect to the display screen; and (d) a selection device. The selection device is responsive to a quantity equalling or exceeding a predetermined quantity, the quantity being a function of the durations of one or more successive periods of intersection of two or more of the successive locations and the selectable region outside the display screen, for selecting the selectable region; whereby the user may select the selectable region outside the display and speak, with the voice output device, the sequence of one or more words.

The invention further includes an apparatus for selecting a menu option associated with an overshoot selectable subregion on a display screen. The apparatus is in a voice output system for a user having impaired motor capability. The apparatus comprises: (a) a voice output device; (b) the display screen; (c) a menu comprising a plurality of menu options, each associated respectively with a sequence of one or more letters; and (d) control means. The control means is for: (1) delimiting a plurality of selectable regions. Each of the selectable regions is associated respectively with one of the plurality of menu options. Each of the selectable regions includes a subregion outside and adjacent the display screen and a subregion on the display screen. The subregion outside and adjacent the display screen and the subregion on the display screen are adjacent one another. The plurality of the subregions on the display screen together at least partially circumscribe a region on the display screen; (2) receiving a movement related signal indicating successive locations with respect to the display screen; (3) in response to a succession of dwell events, each including an intersection of a first one and a second one of the successive locations and one of the subregions outside and adjacent the display screen, selecting the sequence of one or more letters associated with each of the intersected subregions, and appending the selected sequence to at least one previously selected sequence; and (4) speaking, by means of the voice output device, the word spelled by the appended sequences.

The invention includes still another voice output system. The voice output system comprises: (a) a display screen including a working region with a periphery; (b) a movement related signal receiver for receiving a movement related signal indicating a location with respect to the display screen responsive to user movement by a user. The user movement indicates a potential user selection; (c) a delimit device. The delimit device is for delimiting first selectable regions adjacent the periphery of the working region. Each of the first selectable regions is selectable by the user. Each of the first selectable regions has an external boundary wherein the external boundary includes the side of the first selectable region furthest from the working region and has either a confiner for preventing the movement related signal indicating the location from moving beyond the external boundary of the first selectable region or having an activation area extending beyond the external boundary of the first selectable region and beyond the display screen. Each of the first selectable regions is associated respectively with and simultaneously displays a first sequence of one or more characters, a first sequence of one or more words, or a first sequence of one or more symbols representing the first sequence of one or more words; and (d) a voice

output device. The voice output device is for speaking the first sequence of one or more characters or words associated with a particular one of the first selectable regions responsive to a first intersection of the movement related signal and the particular selectable region or the activation area associated therewith, thereby providing the user with the ability to select the particular selectable region while overshooting the particular selectable region or by providing a confiner to the particular selectable region for the movement related signal.

The invention includes yet another voice output system. The voice output system comprises: (a) a surface including a selectable region selectable by a user and associated with a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing a sequence of one or more words; (b) movement related signal receiving means for receiving a movement related signal indicating a first location intersecting the selectable region and, at a later time, a second location intersecting the selectable region; (c) an indicator for indicating to the user in a first manner at least the difference between the time the second location occurs and the time the first location occurs; and (d) a voice output device for speaking the sequence of one or more characters or words associated with the selectable region responsive to a first quantity, the first quantity being a function of the difference, equalling or exceeding a predetermined quantity.

The invention includes a still further voice output system. The voice output system comprises: (a) a display area including a working region with a periphery; (b) a movement related signal receiver for receiving a movement related signal indicating a location with respect to the display area responsive to user movement by a user. The user movement indicates a potential user selection; (c) a menu hierarchy including a menu comprising a plurality of menu options. A specific one of the menu options is associated with a submenu comprising a plurality of submenu options. Each of the submenu options is associated respectively with a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing the sequence of one or more words; (d) a delimit device for delimiting a first and second plurality of selectable regions adjacent the periphery of the working region. Each of the selectable regions is selectable by the user and has an external boundary. Each external boundary includes the side of the selectable region furthest from the working region and has either a confiner for preventing the movement related signal indicating the location from moving beyond

the external boundary of the selectable region or has an activation area extending beyond the external boundary of the selectable region and beyond the display area. A specific one of the first plurality of selectable regions is associated with the specific menu option. Each of the second plurality of selectable regions is associated respectively with and simultaneously displays one of the submenu options; and
5 (e) a voice output device for speaking the particular sequence of one or more characters or words associated with a particular one of the second plurality of selectable regions responsive to a first intersection of the movement related signal and the specific selectable region or the activation area associated therewith and thereafter to a second intersection of the movement related signal and the particular selectable region or the activation area associated therewith, thereby providing the user with
10 the ability to select each of the specific and the particular selectable regions while overshooting the specific or the particular selectable region or by providing a confiner to the specific or the particular selectable region for the movement related signal.

The invention includes another voice output system. The voice output system comprises: (a) a display
15 area including a working region with a periphery; (b) a movement related signal receiver for receiving a movement related signal indicating a location with respect to the display area responsive to user movement by a user. The user movement indicates a potential user selection; (c) a delimit device for delimiting selectable regions adjacent the periphery of the working region. Each of the selectable regions is selectable by the user and has an external boundary. Each external boundary includes the side of the
20 selectable region furthest from the working region and has either a confiner for preventing the movement related signal indicating the location from moving beyond the external boundary of the selectable region or has an activation area extending beyond the external boundary of the selectable region and beyond the display area. Each of the selectable regions is associated respectively with and simultaneously displays a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more
25 symbols representing the sequence of one or more words; and (d) a voice output device for speaking the sequence of one or more characters or words associated with a particular selectable region responsive to a quantity equalling or exceeding a predetermined quantity, the quantity being a function of the duration of a plurality of periods of intersection of the movement related signal and the particular selectable region or the activation area associated therewith, thereby providing the user with the ability to select the
30 particular selectable region while overshooting the particular selectable region or by providing a confiner

to the particular selectable region for the movement related signal.

The invention includes another apparatus for selecting a menu option from a plurality of menu options.

The apparatus comprises: (a) a display area including a working region with a periphery; (b) a movement
5 related signal receiver for receiving a movement related signal indicating a first location with respect to
the display area responsive to a first user movement by a user; (c) a delimit device for delimiting
selectable regions adjacent the working region. Each of the selectable regions has an external boundary.
Each external boundary is the side of the selectable region furthest from the working region. Each of the
selectable regions has either a confiner for preventing the movement related signal indicating the location
10 from moving beyond the external boundary of the selectable region or has an activation area extending
beyond the external boundary of the selectable region. Each of the selectable regions is associated
respectively with one of the menu options; and (d) a selection device for selecting the menu option
associated with a particular one of the selectable regions responsive to an intersection of the first location
indicated by the movement related signal and the particular selectable region or the activation area
15 associated therewith, thereby providing the user with the ability to select the particular selectable region
while overshooting the particular selectable region with the movement related signal or by providing a
confiner to the particular selectable region for the movement related signal.

The invention includes yet another voice output system. The voice output system comprises: (a) a
20 display area including a working region with a periphery; (b) a display device for displaying menu
options on the display area. Each menu option is displayed adjacent the periphery of the working region.
Each menu option is associated respectively with a position of a user activatable switch outside the
display area. The switch is positionable with respect to the location of each menu option for selection
thereof. Each menu option is associated respectively with a sequence of one or more characters, a
25 sequence of one or more words, or a sequence of one or more symbols representing a sequence of one or
more words, for selection via the switch; and (c) a voice output device for speaking the sequence of one
or more characters or words associated with a particular menu option, in response to the position of the
switch corresponding to the particular menu option for a period equalling or exceeding a predetermined
time period.

The invention includes still another voice output system. The voice output system comprises: (a) a display area including a working region with a periphery; (b) a display device for displaying menu options on the display area. Each menu option is displayed adjacent the periphery of the working region. Each menu option is associated respectively with a position of a user activatable switch outside the display area. The switch is positionable with respect to the location of each menu option for selection thereof. Each menu option is associated respectively with a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing a sequence of one or more words, for selection via the switch; and (c) a voice output device for speaking the sequence of one or more characters or words associated with a particular menu option, in response to the position of the switch corresponding to the particular menu option for a first time period equalling or exceeding a predetermined time period. The display device further includes an indicator for indicating to the user at least the difference between the first time period and the predetermined time period.

Another voice output system is included in the invention. The voice output system comprises: (a) a display area including a working region with a periphery; (b) a menu hierarchy including a menu comprising a plurality of menu options. A specific one of the menu options is associated with a submenu comprising a plurality of submenu options. Each of the submenu options is associated respectively with a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing the sequence of one or more words; (c) a display device for displaying menu options and submenu options on the display area. Each menu option is displayed adjacent the periphery of the working region. Each menu option is associated respectively, and each submenu option is associated respectively, with a position of a user activatable switch outside the display area. The switch is positionable with respect to the location of each menu option or submenu option for selection thereof; and (d) a voice output device for speaking the particular sequence of one or more characters or words associated with a particular one of the submenu options, in response to the position of the switch corresponding to the specific menu option for a first time period equalling or exceeding a first predetermined time period and thereafter to the position of the switch corresponding to the particular menu option for a second time period equalling or exceeding a second predetermined time period.

Yet another voice output system is included in the invention. The voice output system comprises:

(a) a display area including a working region with a periphery; (b) a display device for displaying menu options on the display area. Each menu option is displayed adjacent the periphery of the working region. Each menu option is associated respectively with a position of a user activatable switch outside the display area. The switch is positionable with respect to the location of each menu option for selection thereof. Each menu option is associated respectively with a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing a sequence of one or more words, for selection via the switch; and (c) a voice output device for speaking the particular sequence of one or more characters or words associated with a particular one of the menu options, in response a quantity equalling or exceeding a predetermined quantity, the quantity being a function of the duration of a plurality of periods in which the position of the switch corresponds to the particular menu option.

The invention includes a method of speaking for an individual having impaired motor capability and impaired speech. The method comprises the steps of: simultaneously displaying selectable regions adjacent a working region on a display, one or more of the selectable regions associated respectively with a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing a sequence of one or more words; receiving a movement related signal indicating a location with respect to the display, the movement related signal responsive to user movement of a user indicating a potential user selection; speaking the sequence of one or more characters or words associated with a particular one of the one or more selectable regions responsive to a period of intersection of the particular selectable region and the location indicated by the movement related signal or the location on the display closest thereto, the period equalling or exceeding a predetermined period, whereby the user may make a selection although the user movement overshoots the particular selectable region on the display.

The invention includes an apparatus for spelling and speaking a word. The apparatus is in a voice output system for a user having impaired motor capability. The apparatus comprises: (a) a voice output device; (b) a plurality of sequences of one or more letters, which, when appended in a particular order, spell a word; (c) a display on which is displayed a plurality of selectable regions within a polygon on the display. Each selectable region is adjacent a side of the polygon. The plurality of selectable regions

together at least partially circumscribes a region on the display. Each of the selectable regions is associated respectively with and displays on the display one of the sequences of one or more letters; and (d) control means. The control means is for: (1) receiving a movement related signal and moving a cursor within the polygon responsive to the movement related signal; (2) in response to a first selection event associated with an intersection of the cursor and one of the selectable regions, first selecting the sequence associated with the intersected selectable region; (3) in response to a succession of selection events, each associated respectively with an intersection of the cursor and one of the selectable regions, successively appending the sequence of one or more letters associated with the intersected selectable region to the first selected sequence in the particular order; and (4) speaking, by means of the voice output device, the word.

The invention includes an apparatus for voice output. The apparatus comprises: (a) a medium readable by a general purpose computer system including a voice output device and a display screen. The display screen including a working region with a periphery; and (b) a program, stored on the medium and executable by the general purpose computer system. The program is for: (1) receiving a movement related signal indicating a location with respect to the display screen responsive to user movement by a user. The user movement indicates a potential user selection; (2) delimiting selectable regions adjacent the periphery of the working region. Each of the selectable regions is selectable by the user and has an external boundary. Each external the external boundary includes the side of the selectable region furthest from the working region; (3) either preventing the movement related signal indicating the location from moving beyond the external boundary of the selectable region or delimiting an activation area extending beyond the external boundary of the selectable region and beyond the display screen. Each of the selectable regions is associated respectively with and capable of simultaneously displaying a sequence of one or more characters, a sequence of one or more words, or a sequence of one or more symbols representing the sequence of one or more words; and (4) speaking with the voice output device the sequence of one or more characters or words associated with a particular selectable region responsive to an intersection of the movement related signal and the particular selectable region or the activation area associated therewith, thereby providing the user with the ability to select the particular selectable region while overshooting the particular selectable region or by preventing the movement related signal from moving beyond the external boundary of the particular selectable region.

The invention includes another apparatus for selecting a menu option from a plurality of menu options. The apparatus comprises: (a) a medium readable by a general purpose computer system including a display screen; and (b) a program, stored on the medium and executable by the general purpose computer system. The program is for: (1) at least partially delimiting a plurality of selectable regions. Each of the selectable regions is outside the display screen and each is associated respectively with a displayed menu option; (2) receiving a movement related signal indicating successive locations with respect to the display screen; and (3) responsive to a first dwell event associated with a particular one of the selectable regions outside the display screen, the particular selectable region intersected by a plurality of the successive locations, selecting the menu option associated with the particular selectable region.

The invention includes yet another apparatus for selecting a menu option from a plurality of menu options. The apparatus comprises: (a) a display screen; (b) a delimit device for at least partially delimiting a plurality of selectable regions. Each of the selectable regions is outside the display screen and each is associated respectively with a displayed menu option; (c) a movement related signal receiver for receiving a movement related signal indicating successive locations with respect to the display screen; and (d) a selection device, responsive to a first dwell event associated with a particular one of the selectable regions outside the display screen, the particular selectable region intersected by a plurality of the successive locations, for selecting the particular menu option associated with the particular selectable region.

The invention also includes an apparatus for speaking a sequence of one or more words. The apparatus comprises: (a) a voice output device; (b) a plurality of sequences of one or more words, or a plurality of sequences of one or more symbols each sequence of one or more symbols representing one of the sequences of one or more words; (c) a display screen including a working region with a periphery. The display screen is capable of displaying a plurality of selectable regions adjacent the periphery of the working region. Each of the selectable regions is selectable by the user. Each of the selectable regions is associated respectively with and simultaneously displays on the display screen one of the sequences of one or more words or symbols; and (d) control means. The control means is for: (1) receiving a movement related signal indicating a location with respect to the display screen responsive to user movement by a user, the user movement indicating a potential user selection; (2) in response to an

intersection of the location and a particular one of the selectable regions, speaking, by means of the voice output device, the sequence of one or more words associated with the particular selectable region.

5 In addition, the invention includes an apparatus for selecting a desired option from a menu of two or more options shown on a display. The apparatus comprises: (a) a receiver for receiving a movement related signal indicating any one of two or more selectable regions. Each of the selectable regions borders an edge of a zone on the display. The selectable regions include a desired region associated with the desired option; and (b) signal processing circuitry, operatively connected to the receiver to receive the movement related signal. The signal processing circuitry is for: (1) processing the movement related
10 signal in response to the movement related signal overshooting the desired region and the edge of the zone at the location of the desired region, to indicate the desired region; and (2) selecting the desired option in response to the movement related signal indicating the desired region for a predetermined period of time.

15 The invention also includes an apparatus for selecting a desired submenu option from a menu hierarchy. The menu hierarchy includes a menu including two or more menu options. The menu options include a desired menu option associated with a submenu including two or more submenu options. The submenu options include the desired submenu option. The apparatus comprises a receiver for receiving a movement related signal. The movement related signal indicates: (1) any one of two or more first
20 selectable regions. Each of the first selectable regions borders an edge of a first zone on a display. A desired one of the first selectable regions is associated with the desired menu option; and (2) any one of two or more second selectable regions. Each of the second selectable regions borders an edge of a second zone on the display. A desired one of the second selectable regions is associated with the desired submenu option. The apparatus further comprises signal processing circuitry, operatively connected to
25 the receiver to receive the movement related signal. The signal processing circuitry is for: (1) processing the movement related signal in response to the movement related signal overshooting the desired first region and the edge of the first zone at the location of the desired first region, to indicate the desired first region; (2) processing the movement related signal in response to the movement related signal overshooting the desired second region and the edge of the second zone at the location of the desired
30 second region, to indicate the desired second region; and (3) selecting the desired submenu option in

response to the movement related signal indicating: (i) the desired first region for a first predetermined period of time; and (ii) the desired second region for a second predetermined period of time.

The invention also includes a voice output system for speaking a desired sequence of one or more words. The voice output system comprises: (a) a receiver for receiving a movement related signal indicating any one of two or more selectable regions. Each of the selectable regions borders an edge of a zone on a display. A desired one of the selectable regions is associated with the desired sequence; and (b) a voice output device, operatively connected to the receiver to receive the movement related signal. The voice output device is for: (1) processing the movement related signal in response to the movement related signal overshooting the desired region and the edge of the zone at the location of the desired region, to indicate the desired region; and (2) speaking the desired sequence in response to the movement related signal indicating the desired region for a predetermined period of time.

In addition, the invention includes a device controller for outputting a device control signal to a controlled device. The device controller comprises: (a) a receiver for receiving a movement related signal indicating any one of two or more selectable region. Each of the selectable regions borders an edge of a zone on a display. A desired one of the selectable regions is associated with the device control signal; and (b) signal processing circuitry, operatively connected to the receiver and to the controlled device. The signal processing circuitry is for: (1) processing the movement related signal in response to the movement related signal overshooting the desired region and the edge of the zone at the location of the desired region, to indicate the desired region; and (2) outputting the device control signal to the controlled device in response to the movement related signal indicating the desired region for a predetermined period of time.

Also included in the invention is an apparatus for use with a computer system capable of executing an application program. The computer system includes a display. The apparatus is for providing a desired input to the application program. The apparatus comprises: (a) a carrier readable by the computer system; and (b) a program on the carrier. The program is executable by the computer system. The program is for: (1) receiving a movement related signal indicating any one of two or more selectable regions. Each of the selectable regions borders an edge of a zone on the display. A desired one of the

selectable regions is associated with the desired input; (2) processing the movement related signal in response to the movement related signal overshooting the desired region and the edge of the zone at the location of the desired region, to indicate the desired region; and (3) providing the desired input to the application program in response to the movement related signal indicating the desired region for a predetermined period of time.

The invention includes another apparatus for selecting a desired option from a menu of two or more options shown on a display. The apparatus comprises: (a) a receiver for receiving a movement related signal indicating any one of two or more selectable regions. Each of the selectable regions borders an edge of a zone on the display. A desired one of the selectable regions is associated with the desired option; (b) a confiner, operatively connected to the selectable regions and the receiver, for confining the movement related signal within the union of the zone and the selectable regions; and (c) a timer, operatively connected to the selectable regions, for selecting the desired option in response to the movement related signal indicating the desired region for a predetermined period of time.

The invention includes yet another apparatus for selecting a desired option from a menu of two or more options shown on a display. The apparatus comprises: (a) a receiver for receiving a movement related signal responsive to movement of a body member of a user other than either of the user's eyes. The movement related signal indicates any one of two or more selectable regions. Each of the selectable regions is located outside the display. A desired one of the selectable regions is associated with the desired option; and (b) signal processing circuitry, operatively connected to the receiver to receive the movement related signal. The signal processing circuitry is for selecting the desired option in response to the movement related signal indicating the desired region for a predetermined period of time.

The invention includes a method of enabling a user to select a desired option from a menu of two or more options shown on a display. The method comprises the steps of: providing, bordering an edge of a zone on the display, two or more selectable regions, a desired one of the selectable regions associated with the desired option; receiving from the user a movement related signal indicating any one of the selectable regions; processing the movement related signal in response to the movement related signal overshooting the desired region and the edge of the zone at the location of the desired region, to indicate the desired

region; and selecting the desired option in response to the movement related signal indicating the desired region for a predetermined period of time.

5 The invention includes another method of enabling a user to select a desired option from a menu of two or more options shown on a display. The method comprises the steps of: providing, outside the display, two or more selectable regions, a desired one of the selectable regions associated with the desired option; receiving from the user a movement related signal indicating any one of the selectable regions, the movement related signal responsive to movement of a body member of the user other than either of the user's eyes; and selecting the desired option in response to the movement related signal indicating the
10 desired region for a predetermined period of time.

The invention includes yet another method of enabling a user to select a desired option from a menu of two or more options shown on a display. The method comprises the steps of: providing, bordering an edge of a zone on the display, two or more selectable regions, a desired one of the selectable regions
15 associated with the desired option; receiving from the user a movement related signal indicating any one of the selectable regions; confining the movement related signal within the union of the zone and the selectable regions; and selecting the desired option in response to the movement related signal indicating the desired region for a predetermined period of time.

20 The invention includes another apparatus for selecting a desired option from a menu of two or more options shown on a display. The apparatus comprises: (a) a receiver for receiving a movement related signal indicating any one of two or more selectable regions. Each of the selectable regions borders a first edge of a zone on the display. A desired one of the selectable regions is associated with the desired option; and (b) signal processing circuitry, operatively connected to the receiver to receive the movement
25 related signal. The signal processing circuitry is for: (1) processing the movement related signal in response to the movement related signal overshooting the desired region and the first edge of the zone at the location of the desired region, to indicate the desired region; and (2) selecting the desired option in response to a first quantity equalling or exceeding a predetermined quantity. The first quantity is a function of the durations of one or more successive periods during which the movement related signal
30 indicates the desired region.

The invention includes another apparatus for selecting a desired submenu option from a menu hierarchy. The menu hierarchy includes a menu including two or more menu options. The menu options include a desired menu option associated with a submenu including two or more submenu options. The submenu options include the desired submenu option. The apparatus comprises: (a) a receiver for receiving a movement related signal indicating: (1) any one of two or more first selectable regions, each of the first selectable regions bordering an edge of a first zone on a display. A desired one of the first selectable regions is associated with the desired menu option; and (2) any one of two or more second selectable regions, each of the second selectable regions bordering an edge of a second zone on the display. A desired one of the second selectable regions is associated with the desired submenu option; and (b) a confiner, operatively connected to the first selectable regions, the second selectable regions, and the receiver. The confiner is for: (1) confining the movement related signal within the union of the first zone and the first selectable regions; and (2) confining the movement related signal within the union of the second zone and the second selectable regions; and (c) a timer, operatively connected to the first selectable regions and the second selectable regions. The timer is for selecting the desired submenu option in response to the movement related signal indicating: (1) the desired first region for a first predetermined period of time; and (2) the desired second region for a second predetermined period of time.

The invention includes another voice output system for speaking a desired sequence of one or more words. The voice output system comprises: (a) a receiver for receiving a movement related signal indicating any one of two or more selectable regions. Each of the selectable regions borders an edge of a zone on a display. A desired one of the selectable regions is associated with the desired sequence; (b) a confiner, operatively connected to the selectable regions and the receiver, for confining the movement related signal within the union of the zone and the selectable regions; and (c) a voice output device, operatively connected to the receiver to receive the movement related signal, for speaking the desired sequence in response to the movement related signal indicating the desired region for a predetermined period of time.

The invention includes another device controller for outputting a device control signal to a controlled device. The device controller comprises: (a) a receiver for receiving a movement related signal

indicating any one of two or more selectable regions. Each of the selectable regions borders an edge of a zone on a display. A desired one of the selectable regions is associated with the device control signal; (b) a confiner, operatively connected to the selectable regions and the receiver, for confining the movement related signal within the union of the zone and the selectable regions; and (c) signal outputting circuitry, operatively connected to the receiver, for outputting the device control signal to the controlled device in response to the movement related signal indicating the desired region for a predetermined period of time.

The invention includes another apparatus for use with a computer system capable of executing an application program. The computer system includes a display. The apparatus is for providing a desired input to the application program. The apparatus comprises: (a) a carrier readable by the computer system; and (b) a program on the carrier. The program is executable by the computer system. The program is for: (1) receiving a movement related signal indicating any one of two or more selectable regions. Each of the selectable regions borders an edge of a zone on the display. A desired one of the selectable regions is associated with the desired input; (2) confining the movement related signal within the union of the zone and the selectable regions; and (3) providing the desired input to the application program in response to the movement related signal indicating the desired region for a predetermined period of time.

The invention includes yet another apparatus for selecting a desired option from a menu of two or more options shown on a display. The apparatus comprises: (a) a receiver for receiving a movement related signal indicating any one of two or more selectable regions. Each of the selectable regions borders a first edge of a zone on the display. A desired one of the selectable regions is associated with the desired option; (b) a confiner, operatively connected to the selectable regions and the receiver, for confining the movement related signal within the union of the zone and the selectable regions; and (c) signal processing circuitry, operatively connected to the receiver to receive the movement related signal, for selecting the desired option in response to a first quantity equalling or exceeding a predetermined quantity. The first quantity is a function of the durations of one or more successive periods during which the movement related signal indicates the desired region.

Included in the invention is a still further apparatus for selecting a desired option from a menu of two or more options shown on a display. The apparatus comprises: (a) a receiver for receiving a movement related signal indicating any one of two or more selectable regions. Each of the selectable regions is located outside the display. A desired one of the selectable regions is associated with the desired option; (b) signal processing circuitry, operatively connected to the receiver to receive the movement related signal, for selecting the desired option in response to the movement related signal indicating the desired region for a predetermined period of time; and (c) an indicator, operatively connected to the receiver, for indicating to a user prior to the movement related signal indicating the desired selectable region for the predetermined period of time, that the movement related signal indicates the desired region.

The invention includes another apparatus for selecting a desired submenu option from a menu hierarchy. The menu hierarchy includes a menu including two or more menu options. The menu options include a desired menu option associated with a submenu including two or more submenu options. The submenu options include the desired submenu option. The apparatus comprises: (a) a receiver for receiving a movement related signal. The movement related signal indicates: (1) any one of two or more first selectable regions. Each of the first selectable regions is located outside a display. A desired one of the first selectable regions is associated with the desired menu option; and (2) any one of two or more second selectable regions. Each of the second selectable regions is located outside the display. A desired one of the second selectable regions is associated with the desired submenu option; and (b) signal processing circuitry, operatively connected to the receiver to receive the movement related signal. The signal processing circuitry is for selecting the desired submenu option in response to the movement related signal indicating: (1) the desired first region for a first predetermined period of time; and (2) the desired second region for a second predetermined period of time.

The invention includes still another voice output system for speaking a desired sequence of one or more words. The voice output system comprises: (a) a receiver for receiving a movement related signal indicating any one of two or more selectable regions. Each of the selectable regions is located outside a display. A desired one of the selectable regions is associated with the desired sequence; (b) signal processing circuitry, operatively connected to the receiver to receive the movement related signal, for selecting the desired sequence in response to the movement related signal indicating the desired region

for a predetermined period of time; and (c) a voice output device, operatively connected to the signal processing circuitry, for speaking the desired sequence in response to the signal processing circuitry selecting the desired sequence.

5 Included in the invention is yet another device controller for outputting a device control signal to a controlled device. The device controller includes a display for displaying a representation of the device control signal. The device controller comprises: (a) a receiver for receiving a movement related signal indicating any one of two or more selectable regions. Each of the selectable regions is located outside the display. A desired one of the selectable regions associated with the device control signal; (b) signal
10 processing circuitry, operatively connected to the receiver, for outputting the device control signal to the controlled device in response to the movement related signal indicating the desired selectable region for a predetermined period of time; and (c) an indicator, operatively connected to the receiver, for indicating to a user prior to the movement related signal indicating the desired selectable region for the predetermined period of time, that the movement related signal indicates the desired region.

15 Also included in the invention is another apparatus for use with a computer system capable of executing an application program. The computer system includes a display. The apparatus is for providing a desired input to the application program. The apparatus comprises: (a) a carrier readable by the computer system; and (b) a program on the carrier. The program is executable by the computer system.
20 The program is for: (1) receiving a movement related signal indicating any one of two or more selectable regions. Each of the selectable regions is located outside the display. A desired one of the selectable regions is associated with the desired input; (2) providing the desired input to the application program in response to the movement related signal indicating the desired region for a predetermined period of time; and (3) indicating to a user, prior to the movement related signal indicating the desired region for the
25 predetermined period of time, that the movement related signal indicates the desired region.

The invention includes still another apparatus for selecting a desired option from a menu of two or more options shown on a display. The apparatus comprises: (a) a receiver for receiving a movement related signal indicating any one of two or more selectable regions. Each of the selectable regions is located
30 outside the display. A desired one of the selectable regions is associated with the desired option; (b)

signal processing circuitry, operatively connected to the receiver to receive the movement related signal, for selecting the desired option in response to a first quantity equalling or exceeding a predetermined quantity. The first quantity is a function of the durations of one or more successive periods during which the movement related signal indicates the desired region; and (c) an indicator, operatively connected to the receiver, for indicating to a user prior to the the first quantity equalling or exceeding the predetermined quantity, that the movement related signal indicates the desired region.

Also included in the invention is an apparatus for selecting a sequence of one or more graphic symbols from a plurality of sequences of one or more graphic symbols. The apparatus comprises: (a) a display including a working region with a periphery; (b) movement related signal receiving means for receiving a movement related signal indicating each of a first and a second location with respect to the display responsive to user movement of a user, the user movement indicating a potential user selection; (c) delimit means for delimiting a plurality of selectable regions outside the working region and adjacent the periphery of the working region. Each of the selectable regions is selectable by the user and has either: (1) a confiner for preventing the movement related signal indicating the first and the second locations from moving beyond the side of the selectable region furthest from the working region, or (2) an activation area extending beyond the side of the selectable region furthest from the working region and beyond the display. Each of the selectable regions is associated respectively with one of the sequences of one or more graphic symbols. The display is operative to simultaneously display the sequences on the display; and (d) selection means for selecting the sequence associated with a particular one of the selectable regions responsive to a first quantity equalling or exceeding a first predetermined quantity. The first quantity is a function of the duration of a first period of intersection. The first period of intersection starts in response to the first location intersecting the particular selectable region or the activation area associated therewith and ends in response to the second location intersecting the particular selectable region or the activation area associated therewith, thereby providing the user with the ability to select the sequence associated with the particular selectable region either while overshooting the particular selectable region or while the confined movement related signal, if left unconfined, would overshoot the particular selectable region.

The invention includes yet another apparatus for selecting a desired option from a menu of two or more

options, the apparatus comprises: (a) a receiver for receiving: (1) a movement related signal responsive to movement of a body member of a user other than either of the user's hands. The movement related signal indicates any one of two or more selectable regions. Each of the selectable regions is within a zone on a display and each borders an edge of the zone. A desired one of the selectable regions is associated with the desired option; and (2) a switch operation signal indicating an operation of a switch; and (b) signal processing circuitry, operatively connected to the receiver to receive the movement related signal and the switch operation signal, for: (1) processing the movement related signal in response to the movement related signal overshooting the desired region and the edge of the zone at the location of the desired region, to indicate the desired region; and (2) selecting the desired option in response to the movement related signal indicating the desired region at or near the time of the operation of the switch

The invention includes another apparatus for use with a computer system capable of executing an application program. The computer system includes a display and a switch. The apparatus is for providing a desired input to the application program. The apparatus comprises: (a) a carrier readable by the computer system; and (b) a program on the carrier. The program is executable by the computer system. The program is for: (1) receiving: (i) a movement related signal responsive to movement of a body member of a user other than either of the user's hands. The movement related signal indicates any one of two or more selectable regions. Each of the selectable regions is within a zone on the display and each borders an edge of the zone. A desired one of the selectable regions is associated with the desired input; and (ii) a switch operation signal indicating an operation of the switch; and (2) processing the movement related signal in response to the movement related signal overshooting the desired region and the edge of the zone at the location of the desired region, to indicate the desired region; and (3) providing the desired input to the application program in response to the movement related signal indicating the desired region at or near the time of the operation of the switch.

Included in the invention is still another apparatus for selecting a desired option from a menu of two or more options. The apparatus comprises: (a) receiver means for receiving: (1) a movement related signal responsive to movement of a body member of a user other than either of the user's hands. The movement related signal indicates any one of two or more selectable regions. Each of the selectable regions is within a zone on a display and each borders an edge of the zone. A desired one of the selectable regions

is associated with the desired option; and (2) a switch operation signal indicating an operation of a switch; and (b) control means, operatively connected to the receiver means to receive the movement related signal and the switch operation signal. The control means is for: (1) processing the movement related signal in response to the movement related signal overshooting the desired region and the edge of the zone at the location of the desired region, to indicate the desired region; and (2) selecting the desired option in response to the movement related signal indicating the desired region at or near the time of the operation of the switch.

The invention also includes a method of selecting a desired option from a menu of two or more options. The method comprises: receiving: (a) a movement related signal responsive to movement of a body member of a user other than either of the user's hands, the movement related signal indicating any one of two or more selectable regions, each of the selectable regions within a zone on a display and each bordering an edge of the zone, a desired one of the selectable regions associated with the desired option; and (b) a switch operation signal indicating an operation of a switch; processing the movement related signal in response to the movement related signal overshooting the desired region and the edge of the zone at the location of the desired region, to indicate the desired region; and selecting the desired option in response to the movement related signal indicating the desired region at or near the time of the operation of the switch.

Included in the invention is yet another apparatus for selecting a desired option from a menu of two or more options. The apparatus comprises: (a) a receiver for receiving: (1) a movement related signal responsive to movement of a body member of a user other than either of the user's hands. The movement related signal indicates any one of two or more selectable regions. Each of the selectable regions is located outside the display. A desired one of the selectable regions is associated with the desired option; and (2) a switch operation signal indicating an operation of a switch; and (b) signal processing circuitry, operatively connected to the receiver. The signal processing circuitry is for: (1) simultaneously displaying each of the options on the display; (2) indicating to the user that the movement related signal indicates the desired region. The indication to the user is in response to the movement related signal indicating the desired region prior to the time of the operation of the switch; and (3) selecting the desired option in response to the movement related signal indicating the desired region at or near the time of the

operation of the switch.

Further included in the invention is another apparatus for use with a computer system capable of executing an application program. The computer system includes a display and a switch. The apparatus is for providing a desired input to the application program. The apparatus comprises: (a) a carrier readable by the computer system; and (b) a program on the carrier. The program is executable by the computer system. The program is for: (1) receiving: (i) a movement related signal responsive to movement of a body member of a user other than either of the user's hands. The movement related signal indicates any one of two or more selectable regions. Each of the selectable regions is located outside the display. A desired one of the selectable regions is associated with the desired input. An undesired one of the selectable regions is associated with an undesired input; and (ii) a switch operation signal indicating an operation of the switch; and (2) simultaneously displaying the desired input and the undesired input on the display; (3) indicating to the user that the movement related signal indicates the desired region. The indication to the user is in response to the movement related signal indicating the desired region prior to the time of the operation of the switch; and (4) providing the desired input to the application program in response to the movement related signal indicating the desired region at or near the time of the operation of the switch.

The invention includes still another apparatus for selecting a desired option from a menu of two or more options shown on a display. The apparatus comprises: (a) receiver means for receiving: (1) a movement related signal responsive to movement of a body member of a user other than either of the user's hands. The movement related signal indicates any one of two or more selectable regions. Each of the selectable regions located is outside the display. A desired one of the selectable regions is associated with the desired option; and (2) a switch operation signal indicating an operation of a switch; and (b) control means, operatively connected to the receiver means to receive the movement related signal and the switch operation signal. The control means is for: (1) simultaneously displaying each of the options on the display; (2) indicating to the user that the movement related signal indicates the desired region. The indication to the user is in response to the movement related signal indicating the desired region prior to the time of the operation of the switch; and (3) selecting the desired option in response to the movement related signal indicating the desired region at or near the time of the operation of the switch.

The invention also includes a method of selecting a desired option from a menu of two or more options shown on a display. The method comprises: receiving: (a) a movement related signal responsive to movement of a body member of a user other than either of the user's hands, the movement related signal indicating any one of two or more selectable regions, each of the selectable regions located outside the display, a desired one of the selectable regions associated with the desired option; and (b) a switch operation signal indicating an operation of a switch; displaying each of the options on the display simultaneously; indicating to the user that the movement related signal indicates the desired region, the indication to the user in response to the movement related signal indicating the desired region prior to the time of the operation of the switch; and selecting the desired option in response to the movement related signal indicating the desired region at or near the time of the operation of the switch.

In addition, the invention includes an apparatus for selecting a menu option from a menu. The apparatus comprises: (a) a display for displaying at least three menu options. Each menu option is displayed bordering an edge of a zone on the display. Each menu option corresponds respectively to a position of a user activatable switch. The switch is located outside the display. The switch has at least three discrete positions and is positionable with respect to the displayed location of each menu option for selection thereof; and (b) a selection device for selecting a particular one of the menu options in response to the position of the switch corresponding to the particular menu option for a period equalling or exceeding a predetermined time period.

The invention includes yet another apparatus for use with a computer system capable of executing an application program. The computer system includes a display. The apparatus is for providing a desired input to the application program. The apparatus comprises: (a) a carrier readable by the computer system; and (b) a program on the carrier. The program is executable by the computer system. The program is for: (1) displaying on the display at least three menu options. A particular one of the menu options representing the desired input. Each menu option is displayed bordering an edge of a zone on the display. Each menu option corresponds respectively to a position of a user activatable switch. The switch is located outside the display. The switch has at least three discrete positions and is positionable with respect to the displayed location of each menu option for selection thereof; and (2) providing the desired input to the application program in response to the position of the switch corresponding to the

particular menu option for a period equalling or exceeding a predetermined time period.

Included in the invention is yet another device controller for outputting a device control signal to a controlled device. The device controller comprises: (a) a display for displaying at least three menu options. A particular one of the menu options represents the device control signal. Each menu option is displayed bordering an edge of a zone on the display. Each menu option corresponds respectively to a position of a user activatable switch. The switch is located outside the display. The switch has at least three discrete positions and is positionable with respect to the displayed location of each menu option for selection thereof; and (b) signal outputting circuitry for outputting the device control signal to the controlled device in response to the position of the switch corresponding to the particular menu option for a period equalling or exceeding a predetermined time period.

The invention includes another apparatus for selecting a menu option from a menu. The apparatus comprises: (a) display means for displaying at least three menu options. Each menu option is displayed bordering an edge of a zone on the display. Each menu option corresponds respectively to a position of a user activatable switch. The switch is located outside the display. The switch has at least three discrete positions and is positionable with respect to the displayed location of each menu option for selection thereof; and (b) selection means for selecting a particular one of the menu options in response to the position of the switch corresponding to the particular menu option for a first period equalling or exceeding a predetermined time period.

In addition, the invention includes a method of selecting an option from a menu. The method comprises the steps of: displaying at least three menu options, each menu option displayed bordering an edge of a zone on a display, each menu option corresponding respectively to a position of a user activatable switch, the switch located outside the display, having at least three discrete positions and being positionable with respect to the displayed location of each menu option for selection thereof; and selecting a particular one of the menu options in response to the position of the switch corresponding to the particular menu option for a period equalling or exceeding a predetermined time period.

The invention includes still another apparatus in a human interface system. In the human interface

system a body member of an operator may indicate successive locations with respect to a display. The apparatus is for selecting a menu option from a plurality of menu options. The apparatus comprises: (a) the display having thereon a first plurality of selectable regions. Each of the first plurality of selectable regions is associated respectively with one of the menu options; (b) means for at least partially delimiting
5 a second plurality of selectable regions. Each of the second plurality of selectable regions is located outside the display and each is associated respectively with one of the first plurality of selectable region; (c) in response to a first quantity equalling or exceeding a predetermined quantity, the first quantity being a function of: (1) the durations of one or more successive periods of intersection of two or more of the successive locations and one of the selectable regions on the display; and (2) the durations of one or more
10 successive periods of intersection of two or more of the successive locations and the selectable region outside the display associated with the one of the selectable regions on the display; a selection device for selecting the menu option associated with the one of the selectable regions on the display.

The invention also includes a method of inputting data to a computer program for an operator having
15 impaired motor capability. The method comprises the steps of: displaying a plurality of selectable regions within a polygon on a display, each selectable region adjacent a side of the polygon and each selectable region associated respectively with an input for the computer program, the plurality of selectable regions together at least partially circumscribing a region on the display; receiving a movement related signal and moving at least part of a cursor only within the polygon responsive to the movement
20 related signal; and in response to a first quantity equalling or exceeding a predetermined quantity, the first quantity being a function of the durations of one or more successive periods of intersection of the cursor and one of the selectable regions, inputting the input associated with the intersected selectable region to the computer program.